

§48. Dust Measurement in TRIAM-1M using Fast Camera

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Dust in plasma is very popular problem in nuclear fusion reactor due to tritium inventory and impurity source. The candidate of dust should be the wall and/or limiter. It is natural thought that the process of dust formation relates temperature of the wall/limiter. Triam-1M can afford to have long time discharges and it is very suitable machine to research this dust formation. In this study to investigate the dust source and the behavior of dust in plasma two coherent fiber bundles and one fast camera are provided, and it is tried to get the information of dust position with 3-dimension. The length of the port duct is long (>2m) due to the super conductor machine. Therefore, two long tubes for coherent fiber bundles are installed in Triam-1M (see Fig.1). Also, a telecentric optical system is designed to get two ends of both fiber bundles together to make an image on the camera sensor (see Fig.2).

It was obtained by fast camera measurement at previous our work [1] that dust particle motion in a plasma was about a few m/s to a few hundreds m/s, and also dust formation relates temperature of the limiter in Triam-1M. The velocity ambiguity is due to one eye measurement. Therefore, 3-d dust measurement is very important for comparison with dust theory and experimental results. Unfortunately one fiber bundle was damaged by hard X-ray due to run away discharges during test season. Therefore, it is impossible to get the accurate dust position at this time. Figure 3 shows typical image of dust particle in Triam-1M limiter plasma. In this image dust is generated on Mo limiter, and the source area of dust on the limiter is heated up and brightened by plasma contact. Camera images show dust motion in plasma was very complicated. Dust particle was accelerated sometimes and decelerated in another moment.

These motions are thought to be caused by charge up of dust particle due to electron attachment. After plasma experiment dust collection plan will be performed and dust composition will be analyzed by EPMA. The results will be presented to the international meeting [2].

Triam-1M is shut down at 2005. Therefore, it is decided that the fast camera will be installed to the next device 'QUEST' at Kyushu University, and dust measurement will be continued

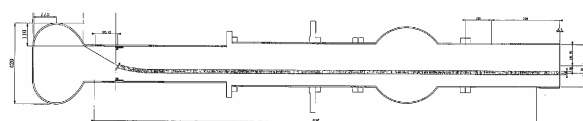


Fig.1

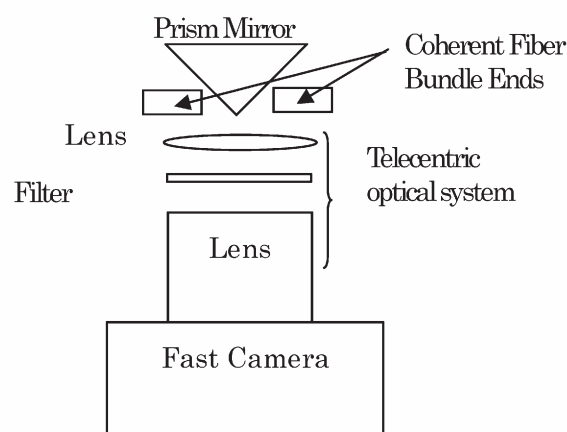


Fig.2

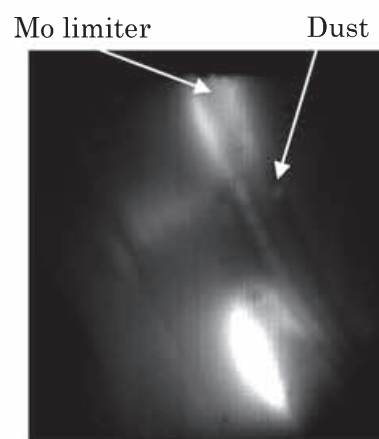


Fig.3

- 1). Sasaki, K., et.al.: JPFS meeting
- 2). Sasaki, K., et.al.: 17th Plasma-Surface Interaction